UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,264	10/30/2003	Christos Karamanolis	200311962-1	2956

22879 7590 01/04/2006

HEWLETT PACKARD COMPANY
P O BOX 272400, 3404 E. HARMONY ROAD
INTELLECTUAL PROPERTY ADMINISTRATION
FORT COLLINS, CO 80527-2400

EXAMINER	
GOLDEN, JAMES R	

ART UNIT	PAPER NUMBER
2187	

DATE MAILED: 01/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/698,264	KARAMANOLIS ET AL.	
	Examiner	Art Unit	
	James Golden	2187	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 October 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *02/09/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The instant application 10/698264 has a total of 31 claims pending. There are 6 independent claims and 25 dependent claims. Claims 1-31 have been rejected under statutory basis and in view of prior art.

Information Disclosure Statement

1. The information disclosure statement submitted on 02/09/2004 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 712 of Fig. 7A.

3. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The title "Method for Determining Optimal Location of Replica Data in Network Nodes and Bounds for Minimum Cost" is suggested.

5. The disclosure is objected to because of the following informalities: the Application Numbers of the related applications are not given (page 1, line 4) and should be listed as --10698182, 10698264 and 10698265--; "(filed on the same day as this application)" (page 1, lines 5-6) should be corrected to --10/30/2003--; "allowable lime" (page 6, line 9) should be corrected. Appropriate correction is required.

6. The examiner respectfully requests that applicant correct the mention of figures in the disclosure (figure 1, figure 2, etc.) to read --Fig. 1-- and --Fig. 2--.

Claim Objections

7. Claims 6 and 8 recite the limitation "the workload" in lines 3 and 2, respectively. There is insufficient antecedent basis for this limitation in the claim. These objections could be overcome by correcting the claims to read --a workload--.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. **Claims 1-4 and 12-22** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. A method requires a tangible result to be considered statutory, and therefore only the claims that include the step of "measuring the performance and replication cost, which are provided as outputs" (disclosure, page 27, line 24) are considered statutory. This includes all claims with the limitation "evaluating a placement of the data objects."

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. **Claims 1-31** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. The phrase "within an allowable limit of a minimum replication cost" in claims 1, 23, 26 and 29-31 is a relative phrase which renders the claim indefinite. The phrase "within an allowable limit of a minimum replication cost" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Claims 2-22, 24-26 and 27-28 are rejected because of their dependence on claims 1, 23, 26 and 29-31.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. **Claims 1-9, 12-13, 16-18, 23-24 and 26-31** are rejected under 35 U.S.C. 102(b) as being anticipated by Karlsson et al. ("Do We Really Need Replica Placement Algorithms in Content Delivery Networks?").

15. **With respect to claim 1**, Karlsson et al. disclose a method of determining data placement for a distributed storage system comprising the steps of:

- selecting a heuristic class (page 3 [page 1 has abstract and introduction], column 2, paragraph 4 -- page 5, column 1, paragraph 1) which meets a performance requirement (page 5, column 1, paragraph 2 -- column 2, paragraph 1) and which provides a replication cost that is within an allowable limit of a minimum

replication cost (page 3, column 2, paragraph 2; cost is a constraint, and the particular cost value at which the constraint is violated is the limit); and

- instantiating a data placement heuristic selected from a range of data placement heuristics according to the heuristic class (page 5, column 2, paragraph 2 -- page 6, column 1, paragraph 3).

16. **With respect to claim 2**, Karlsson et al. disclose the method of claim 1 (see above paragraph 15) wherein the performance requirement comprises a bi-modal performance metric (page 5, column 1, paragraph 2 -- column 2, paragraph 1).

17. **With respect to claim 3**, Karlsson et al. disclose the method of claim 2 (see above paragraph 16) wherein the bi-modal performance requirement comprises a criterion (page 5, column 1, paragraph 2, lines 7-8) and a ratio of successful requests to total requests (page 5, column 1, paragraph 2, line 8 -- column 2, paragraph 1; a successful request is a request that has "a response latency below Y msec").

18. **With respect to claim 4**, Karlsson et al. disclose the method of claim 1 (see above paragraph 15) wherein the data placement heuristic comprises a computer-implemented technique of placing data objects onto nodes of the distributed storage system (page 5, column 2, paragraph 2, where *Coeus* is a computer-implemented tool that "produces the placement for" the algorithms).

19. **With respect to claim 5**, Karlsson et al. disclose the method of claim 4 (see above paragraph 18) further comprising the step of evaluating a placement of the data objects (Figure 1; page 6, column 2, paragraph 3 -- page 7, column 1, paragraph 1; Figure 2; page 8, column 1, paragraph 3 -- column 2, paragraph 1).

20. **With respect to claim 6**, Karlsson et al. disclose the method of claim 5 (see above paragraph 19) wherein the step of evaluating the data placement heuristic provides a performance result and a cost result for the system configuration and the workload (Figure 1; page 6, column 2, paragraph 3 -- page 7, column 1, paragraph 1; the graphs illustrate the performance result and the table lists the cost).

21. **With respect to claim 7**, Karlsson et al. disclose the method of claim 5 (see above paragraph 19) wherein the step of instantiating the data placement heuristic comprises simulating an instantiation of the data placement heuristic (page 4, column 2, paragraph 1, lines 1-2).

22. **With respect to claim 8**, Karlsson et al. disclose the method of claim 7 (see above paragraph 21) further comprising the steps of:

- selecting a second heuristic class for the workload and a second system configuration (page 3, column 2, paragraph 4 -- page 5, column 1, paragraph 1; a second heuristic will create a different system configuration than the first);
- instantiating a second data placement heuristic according to the second heuristic class (page 5, column 2, paragraph 2 -- page 6, column 1, paragraph 3); and
- evaluating a second placement of the data object made according to the second data placement heuristic (Figure 1; page 6, column 2, paragraph 3 -- page 7, column 1, paragraph 1; Figure 2; page 8, column 1, paragraph 3 -- column 2, paragraph 1).

23. **With respect to claim 9**, Karlsson et al. disclose the method of claim 7 (see above paragraph 21) further comprising the steps of:

- selecting a second heuristic class for the system configuration and a second workload (Figure 2; page 8, column 1, paragraph 2 -- column 2, paragraph 1; since the storage capacities of the individual nodes vary, the load on each node varies as well);
- instantiating a second data placement heuristic according to the second heuristic class (page 5, column 2, paragraph 2 -- page 6, column 1, paragraph 3); and
- evaluating a second placement of the data object made according to the second data placement heuristic (Figure 1; page 6, column 2, paragraph 3 -- page 7, column 1, paragraph 1; Figure 2; page 8, column 1, paragraph 3 -- column 2, paragraph 1).

24. **With respect to claim 12**, Karlsson et al. disclose the method of claim 1 (see above paragraph 15) wherein the performance requirement comprises a data access latency (page 5, column 1, paragraph 2, lines 7-8).

25. **With respect to claim 13**, Karlsson et al. disclose the method of claim 1 (see above paragraph 15) wherein the performance requirement comprises an average data access latency (page 5, column 1, paragraph 2, lines 7-8).

26. **With respect to claim 16**, Karlsson et al. disclose the method of claim 1 (see above paragraph 15) wherein the step of selecting the heuristic class determines a plurality of heuristic parameters (page 6, column 1, paragraph 1; when these heuristics are chosen, these parameters are set).

27. **With respect to claim 17**, Karlsson et al. disclose the method of claim 16 (see above paragraph 26) wherein the step of instantiating the data placement heuristic

instantiates the data placement heuristic according to the heuristic parameters (page 6, column 1, paragraph 1).

28. **With respect to claim 18**, Karlsson et al. disclose the method of claim 16 (see above paragraph 27) wherein the step of instantiating the data placement heuristic sets other heuristic parameters to defaults (page 6, column 1, paragraph 1).

29. **With respect to claim 23**, Karlsson et al. disclose a method of determining data placement for a distributed storage system comprising the steps of:

- selecting a heuristic class (page 3, column 2, paragraph 4 -- page 5, column 1, paragraph 1) which meets a performance requirement (page 5, column 1, paragraph 2 -- column 2, paragraph 1) and which provides a replication cost that is within an allowable limit of a minimum replication cost (page 3, column 2, paragraph 2; cost is a constraint, and the particular cost value at which the constraint is violated is the limit); and
- instantiating a data placement heuristic selected from a range of data placement heuristics according to the heuristic class (page 5, column 2, paragraph 2 -- page 6, column 1, paragraph 3); and
- evaluating a placement of data objects onto nodes of the distributed storage system made according to the data placement heuristic (Figure 1; page 6, column 2, paragraph 3 -- page 7, column 1, paragraph 1; Figure 2; page 8, column 1, paragraph 3 -- column 2, paragraph 1).

30. **With respect to claim 24**, Karlsson et al. disclose the method of claim 23 (see above paragraph 29) wherein the step of instantiating the data placement heuristic

comprises simulating an instantiation of the data placement heuristic (page 4, column 2, paragraph 1, lines 1-2).

31. **With respect to claim 26**, Karlsson et al. disclose the method of claim 23 (see above paragraph 29) wherein

- selecting a heuristic class (page 3, column 2, paragraph 4 -- page 5, column 1, paragraph 1) which meets a performance requirement (page 5, column 1, paragraph 2 -- column 2, paragraph 1) and which provides a replication cost that is within an allowable limit of a minimum replication cost (page 3, column 2, paragraph 2; cost is a constraint, and the particular cost value at which the constraint is violated is the limit); and
- instantiating a data placement heuristic selected from a range of data placement heuristics according to the heuristic class (page 5, column 2, paragraph 2 -- page 6, column 1, paragraph 3); and
- evaluating a placement of data objects onto nodes of the distributed storage system made according to the data placement heuristic (Figure 1; page 6, column 2, paragraph 3 -- page 7, column 1, paragraph 1; Figure 2; page 8, column 1, paragraph 3 -- column 2, paragraph 1); and
- iteratively performing the steps of selecting the heuristic class, instantiating the data placement heuristic, and evaluating the placement of the data objects (Figures 1 and 2 show results for several different heuristics, indicating an iterative selection, instantiation and evaluation).

32. **With respect to claim 27**, Karlsson et al. disclose the method of claim 26 (see above paragraph 31) wherein second and subsequent performance of the steps of selecting the heuristic class, instantiating the data placement heuristic, and evaluating the placement of the data objects seeks to improve the data placement heuristic (page 1, column 2, paragraph 2; the quantitative evaluation of all the data placement heuristics is used to determine whether any heuristics are better than caching, and this entails searching for the best heuristic).

33. **With respect to claim 28** Karlsson et al. disclose the method of claim 26 (see above paragraph 31) wherein second and subsequent performance of the steps of selecting the heuristic class, instantiating the data placement heuristic, and evaluating the placement of the data objects seeks to modify the data placement heuristic to account for a changing workload (Figure 2; page 8, column 1, paragraph 2 -- column 2, paragraph 1; since the storage capacities of the individual nodes vary, the load on each node varies as well).

34. **With respect to claim 29**, Karlsson et al. disclose a computer readable memory comprising computer code for implementing a method of determining data placement for a distributed storage system, the method of determining the data placement comprising the steps of:

- selecting a heuristic class (page 3, column 2, paragraph 4 -- page 5, column 1, paragraph 1) which meets a performance requirement (page 5, column 1, paragraph 2 -- column 2, paragraph 1) and which provides a replication cost that is within an allowable limit of a minimum replication cost (page 3, column 2,

paragraph 2; cost is a constraint, and the particular cost value at which the constraint is violated is the limit); and

- instantiating a data placement heuristic selected from a range of data placement heuristics according to the heuristic class (page 5, column 2, paragraph 2 -- page 6, column 1, paragraph 3).

35. **With respect to claim 30**, Karlsson et al. disclose a computer readable memory comprising computer code for implementing a method of determining data placement for a distributed storage system, the method of determining the data placement comprising the steps of:

- selecting a heuristic class (page 3, column 2, paragraph 4 -- page 5, column 1, paragraph 1) which meets a performance requirement (page 5, column 1, paragraph 2 -- column 2, paragraph 1) and which provides a replication cost that is within an allowable limit of a minimum replication cost (page 3, column 2, paragraph 2; cost is a constraint, and the particular cost value at which the constraint is violated is the limit); and
- instantiating a data placement heuristic selected from a range of data placement heuristics according to the heuristic class (page 5, column 2, paragraph 2 -- page 6, column 1, paragraph 3); and
- evaluating a placement of data objects onto nodes of the distributed storage system made according to the data placement heuristic (Figure 1; page 6, column 2, paragraph 3 -- page 7, column 1, paragraph 1; Figure 2; page 8, column 1, paragraph 3 -- column 2, paragraph 1).

36. **With respect to claim 31**, Karlsson et al. disclose a computer readable memory comprising computer code for implementing a method of determining data placement for a distributed storage system, the method of determining the data placement comprising the steps of:

- selecting a heuristic class (page 3 [page 1 has abstract and introduction], column 2, paragraph 4 -- page 5, column 1, paragraph 1) which meets a performance requirement (page 5, column 1, paragraph 2 -- column 2, paragraph 1) and which provides a replication cost that is within an allowable limit of a minimum replication cost (page 3, column 2, paragraph 2; cost is a constraint, and the particular cost value at which the constraint is violated is the limit); and
- instantiating a data placement heuristic selected from a range of data placement heuristics according to the heuristic class (page 5, column 2, paragraph 2 -- page 6, column 1, paragraph 3); and
- evaluating a placement of data objects onto nodes of the distributed storage system made according to the data placement heuristic (Figure 1; page 6, column 2, paragraph 3 -- page 7, column 1, paragraph 1; Figure 2; page 8, column 1, paragraph 3 -- column 2, paragraph 1); and
- iteratively performing the steps of selecting the heuristic class, instantiating the data placement heuristic, and evaluating the placement of the data objects (Figures 1 and 2 show results for several different heuristics, indicating an iterative selection, instantiation and evaluation).

37. **Claims 1, 14-15, 19 and 20-22** are rejected under 35 U.S.C. 102(b) as being anticipated by Karlsson et al. ("A Framework for Evaluating Replica Placement Algorithms").

38. **With respect to claim 1**, Karlsson et al. disclose

- selecting a heuristic class (page 2, column 1, paragraph 2, lines 6-11) which meets a performance requirement (page 9, column 2, paragraph 1, lines 2-3) and which provides a replication cost that is within an allowable limit of a minimum replication cost (page 5, column 1, paragraph 5, "Fixed Threshold"); and
- instantiating a data placement heuristic selected from a range of data placement heuristics according to the heuristic class (page 2, column 1, paragraph 2, lines 8-11).

39. **With respect to claim 14**, Karlsson et al. disclose the method of claim 1 (see above paragraph 38) wherein the performance requirement comprises a data access bandwidth (page 3, column 1, paragraph 5).

40. **With respect to claim 15**, Karlsson et al. disclose the method of claim 1 (see above paragraph 38) wherein the performance requirement comprises a data update time (page 4, column 1, paragraph 2, line 5 -- column 2, paragraph 1, line 2).

41. **With respect to claim 19**, Karlsson et al. disclose the method of claim 1 (see above paragraph 15) wherein the replication cost comprises data storage cost (page 2, column 2, paragraph 7).

42. **With respect to claim 20**, Karlsson et al. disclose the method of claim 1 (see above paragraph 38) wherein the replication cost comprises a replica creation cost

(page 3, column 1, paragraph 5, "Link Capacity;" a bandwidth constraint factored into the cost "for objects being replicated").

43. **With respect to claim 21**, Karlsson et al. disclose the method of claim 20 (see above paragraph 42) wherein the replica creation cost comprises a network bandwidth cost for transferring replicas and replica changes (page 3, column 1, paragraph 5, "Link Capacity;" a bandwidth constraint factored into the cost "for objects being replicated").

44. **With respect to claim 22**, Karlsson et al. disclose the method of claim 20 (see above paragraph 42) wherein the replica creation cost comprises a system load cost for running the data placement heuristic (page 3, column 1, paragraph 3, "Load Capacity;" this constraint accounts for "the rate of requests a node can serve", which would include requests resulting from running the data placement heuristic).

Claim Rejections - 35 USC § 103

45. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

46. **Claims 10-11 and 25** are rejected under 35 U.S.C. 103(a) as being anticipated over Karlsson et al. ("Do We Really Need Replica Placement Algorithms in Content Delivery Networks?") in view of Lumelsky et al. (US 6,466,980).

47. **With respect to claim 10**, Karlsson et al. disclose the method of claim 5 (see above paragraph 19).

Karlsson et al. do not disclose the limitation wherein the step of instantiating the data placement heuristic comprises instantiating the data placement heuristic on an actual distributed storage system operating with an actual workload.

However, Lumelsky et al. disclose the limitation wherein the step of instantiating the data placement heuristic comprises instantiating the data placement heuristic on an actual distributed storage system operating with an actual workload (Figs. 4 and 5; column 8, lines 12-35; column 11, lines 27-31; the actual workload is inherent in operating the heuristic in an actual system).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to implement one of the data placement heuristics described in Karlsson et al. on an actual system as described by Lumelsky et al. The motivation for doing so would have been to provide "an adaptive resource management function for distributed resources that could, on-demand, shape system capacity to the needs of the environment" (column 6, lines 4-9).

Therefore, it would have been obvious to combine Lumelsky et al. with Karlsson et al. for the benefit of an actual system that utilizes a data placement heuristic to obtain the invention as specified in claim 10.

48. **With respect to claim 11**, Karlsson et al. disclose the method of claim 10 (see above paragraph 47) further comprising the steps of:

- selecting a second heuristic class for the system configuration and the workload (Figure 2; page 8, column 1, paragraph 2 -- column 2, paragraph 1; since the

storage capacities of the individual nodes vary, the load on each node varies as well);

- instantiating a second data placement heuristic according to the second heuristic class (page 5, column 2, paragraph 2 -- page 6, column 1, paragraph 3); and
- evaluating a second placement of the data object made according to the second data placement heuristic (Figure 1; page 6, column 2, paragraph 3 -- page 7, column 1, paragraph 1; Figure 2; page 8, column 1, paragraph 3 -- column 2, paragraph 1).

Karlsson et al. do not disclose the limitation wherein the second heuristic is selected for an actual workload.

However, Lumelsky et al. disclose the limitation wherein an actual distributed storage system operating with an actual workload uses the heuristic (Figs. 4 and 5; column 8, lines 12-35; column 11, lines 27-31; the actual workload is inherent in operating the heuristic in an actual system).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to implement one of the data placement heuristics described in Karlsson et al. on an actual system as described by Lumelsky et al. The motivation for doing so would have been to provide "an adaptive resource management function for distributed resources that could, on-demand, shape system capacity to the needs of the environment" (column 6, lines 4-9).

Therefore, it would have been obvious to combine Lumelsky et al. with Karlsson et al. for the benefit of an actual system that utilizes a data placement heuristic to obtain the invention as specified in claim 11.

49. **With respect to claim 25**, Karlsson et al. disclose the method of claim 23 (see above paragraph 9).

Karlsson et al. do not disclose the limitation wherein the step of instantiating the data placement heuristic comprises instantiating the data placement heuristic on an actual distributed storage system operating with an actual workload.

However, Lumelsky et al. disclose the limitation wherein the step of instantiating the data placement heuristic comprises instantiating the data placement heuristic on an actual distributed storage system operating with an actual workload (Figs. 4 and 5; column 8, lines 12-35; column 11, lines 27-31; the actual workload is inherent in operating the heuristic in an actual system).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to implement one of the data placement heuristics described in Karlsson et al. on an actual system as described by Lumelsky et al. The motivation for doing so would have been to provide "an adaptive resource management function for distributed resources that could, on-demand, shape system capacity to the needs of the environment" (column 6, lines 4-9).

Therefore, it would have been obvious to combine Lumelsky et al. with Karlsson et al. for the benefit of an actual system that utilizes a data placement heuristic to obtain the invention as specified in claim 10.

Conclusion

50. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Borowsky et al. (US 6,321,317) teaches the use of heuristics in organizing a data storage network.
- Richardson et al. (US 6,249,802) teaches a method for distributing replicas in a data storage network.
- Lumelsky et al. (US 6,463,454) teaches the system in which heuristics are used to manage replicas as in the above-cited patent (US 6,466,980).
- Karlsson et al. (US 2004/0034744) teaches a data storage system using caching instead of replica placement.
- Karlsson et al., "Choosing Replica Placement Heuristics for Wide-Area Systems," 2004, IEEE Conference on Distributed Computing Systems, pages 350-359.
- Bartolini et al., "Optimal Replica Placement in Content Delivery Networks," September 28, 2003, IEEE Conference on Networks, pages 125-130.

51. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Golden whose telephone number is 571-272-5628. The examiner can normally be reached on Monday-Friday, 8:30 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 571-272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James R. Golden
Patent Examiner
Art Unit 2187

December 15, 2005

Primary Examiner
AU 2187
12/26/05